

Abstract

Managing Water and Auxiliary Power in Fuel Cell Power Plant Below Freezing Temperatures

5 A stack (11) of fuel cells have water flow channels receiving
water through a pump (33) from an accumulator (29) having double
walls (63, 66) with vacuum insulation panels (VIPs) (65, 68)
therebetween, auxiliary DC power source (80) (battery or
supercapacitor) is disposed in a container (43) having double walls
(81, 86) with VIPs (65, 68) encapsulated therebetween. A keep-
warm heater (51) keeps the source warm enough for at least half
10 power capacity, the source driving its own heater as well as a keep-
warm heater (50) in the accumulator to keep the accumulator above
freezing. A microwave heater (58) disposed in the accumulator
distributes energy to melt ice using fuel cell stack power upon
startup.